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ABSTRACT

Designed for school personnel, the booklet provides guidelines for the identification of scientifically creative preschool through fifth grade students and gives suggestions for the implementation of a creative scientific classroom. Seven general recommendations, e.g., that identification should be individualized rather than part of group testing, and four specific recommendations for assessing scientific creativity are listed. Twenty characteristics of scientifically creative elementary students are described. Suggestions for administrators, teachers, and parents in fostering the creativity of this population are reviewed. Other sections consider such areas as self improvement activities and the use of creative questioning. Examples of checklists for interviewing students and examples of appropriate materials are included. (PHR)

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Guidelines for the Education of the Scientifically Creative Student: Preschool-5th Grade

Division of Curriculum
Indiana Department of Public Instruction
Harold H. Negley, Superintendent

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INTRODUCTION

In 1975, the Indiana Department of Public Instruction endorsed the definition of gifted and talented children recommended by the National Leadership Training Institute and Council for Exceptional Children. This definition acknowledges that children may be gifted and talented in one or in combinations of the following:

1. Academically gifted - general intellectual ability and/or demonstrated specific academic aptitude.

2. Creatively gifted - divergent, imaginative, original, or productive thinking.

3. Kinesthetically gifted - psychomotor talent or skills in the visual or performing arts.

4. Leadership gifted - leadership ability and ethical or moral development.

Traditionally, giftedness has been associated with the "academic" definition and generally has been assessed and identified by using a combination of intelligence and achievement scores. Since the 1950's creativity has received the most attention when addressing the issue of giftedness. More recently, many psychologists and educators have agreed that assessment and identification of the gifted should be based on multi-criteria of which IQ should be only one of the equally weighted criteria. Studies by Torrance (1) indicate that using IQ alone as an indicator of creative ability would eliminate 70 per cent of the most creatively gifted children from further enrichment.

Creativity has been difficult to define, assess, and measure because this phenomenon is so illusive. Creativity has often been confused with brightness, conformity, verbal skills, orderliness, and mental alertness. Characteristics such as the aforementioned may point toward creativity without actually being creativity.

Synthetic or inductive thinking is a critical prerequisite for scientific creativity. Synthesis requires that students put parts together to make patterns that are new to them. Components of synthetic thought may include the production of a unique communication, formulating of a plan or proposed set of operations/ procedures, and derivation of a set of abstract relations. These actions require much higher creative thinking processes. The emphasis of these subcategories of creative thought is upon divergent thinking. That is, a problem is presented in an open-ended fashion and as many solutions as possible are encouraged. Association of a selected problem and the student's life situation is deemed highly desirable in terms of increasing motivation.

On such a basis, these guidelines operate on the assumption that if creative individuals can be identified there is a high possibility that identifying the scientifically creative will be significantly increased.

Creativity is not unique to science-prone children. Thus, the basic needs of scientifically creative children are likely to be similar for creative children as a collective group.

Dr. Paul Blackwood (2) has proposed an operational definition of scientific creativity which suggests that it is "man's relentless search for verifiable patterns, concepts, descriptions, or explanations of phenomena in the universe." Blackwood sees science as an

activity pursued by people. The search leads to new discoveries, insights, and patterns about which people can communicate and apply.

STATEMENT OF PROBLEM

For many reasons, schools generally have not rewarded or recognized individual creativity in any area, much less the sciences. This situation may exist due to the stress on conformity in schools, the methods of instruction, and teachers' proneness to not dealing with the more open, divergent methods to learning. Two elementary classroom seetings will illustrate the nature of the problem. Each of the two classes contains 30 students. In one class all 30 students are listening to the teacher read sections of the science lesson. All students are doing the same assignment. There are no aquaria, models, microscopes, or living organisms except for a few plants. The room is very clean, orderly, highly structured, and sterile. In the other classroom some students are experimenting with seed germination, others are involved in a weather study, some are working on science fair projects, and some are caring for colonies of crickets, sow bugs, crayfish, and guppies. The room appears busy, enthusiastic, and a bit noisy. In this classroom the teacher's role is one of a facilitator of learning rather than a disseminator of knowledge.

Science holds a general interest for most elementary children. However, in order to assess and identify the creatively gifted in science, one should look for those children who have exhibited a prolonged and highly motivated interest in science (3.4.5), coupled with the characteristics of divergent thinking, originality, and

imaginative thought with resulting productive and/or novel ideas which are possible solutions to situations and problems.

Thus, administrators, teachers, and parents should urge openness in the classroom and be alert to recognize characteristics which might be indicative of scientific creativity. The earlier students experience open classes with freedom for inquiry, the earlier scientifically creative children can be identified. Such indicators are often present in the preschool years. Suggestions for administrators, parents, and teachers are to be found on pages 10-26.

The following are viewed as basic needs in recognizing scientifically creative children in the elementary years.

1. Identification of special talents, abilities, and interests, using suitable testing instruments and techniques is necessary in order to program for individuals whose needs are not being met in the typical convergent classroom environment.

2. Identification of gifted students is needed in order to meet the intent of federal legislation since it urges subsequent development of enriching opportunities for such students not met in the regular curriculum.

3. Identification of promising individuals at an early age is necessary so that their talents of hypothesizing, planning, decision making, and forecasting may be developed and encouraged.

4. Identification must not be considered final at any time. There is need for continual reassessment since individual giftedness tends to peak at different times and under various situations.

5. Identification should not be regarded as a temporary phenomenon which is the responsibility of any single person. Once identification is accomplished it must be utilized throughout the school system so that the scientifically creative student will have enriching opportunities throughout his/her education.

Proper identification beginning in the preschool years should result in positive benefits for both the individual and society. Consequently, the lack of identification means a large social and economic loss.

GENERAL RECOMMENDATIONS

It must be recognized that each school system has its own course of study which indicates the selection of content and learning activities for the science taught in that school. The course of study between various school systems may be quite different but it should be the common goal of all schools to address individual needs, talents, abilities, and interests. The scientifically creative child has certain needs, interests, and abilities that need to be assessed and nurtured. The following recommendations are suggested for the creative science student at the elementary level.

1. Multiple-criteria assessment and identification should be individualized rather than part of the group testing program and should always include approaches other than pencil and paper tests. The latter need is particularly important in crossing ethnic and socio-economic backgrounds. This in turn suggests the need for special training of test administrators and those in decision-making roles.

2. This multi-criteria identification of a scientifically creative child should be a continuous long-range assessment.

3. Selection of testing instruments and techniques should be carefully planned to reflect a high usability in terms of convenience, economy, and interpretability.

4. A panel of individuals should be involved in the student selection process.

5. Creating an environment having some structure but considerable flexibility and freedom should allow growth of the creatively gifted child. Convergent and constraining environments generally will not be conducive to the nurturing of creative expression.

6. Clarification, justification, and publicizing the objectives of gifted and talented programs should be one definite goal of the school's public relations department. School boards, administrators, teachers, parents, counselors, and the community in general must be behind the effort if it is to succeed. Intense in-service training and community education are desirable and preferred over the massive "purchasing" of new programs and materials.

7. Creation of various alternatives dealing with the creatively gifted in elementary science should include early school entry, enrichment within the heterogeneous classroom, partial grouping based on interest and abilities, acceleration options such as grade skipping and course content acceleration. No single model is most appropriate. Local resources, staff characteristics, and local socio-economic factors all vary. The individual needs of the child and the local school factors should dictate the program choice.

SCIENTIFIC CREATIVITY: SPECIFIC RECOMMENDATIONS

In order to identify a scientifically creative child, information input from many sources is desirable. Parents, teachers, counselors, administrators, peers, and the child are all valuable sources of information. The former, with the exceptions of peers and the child, should be supplied with checklists on which they indicate observations of characteristics (see pages 20-27). These checklists should be filled out on a regular basis for continuous long-range assessment. Teachers and parents are vital sources of behavioral information since the child spends nearly all his/her time around one or the other. Both teachers and parents need to be more observant and sensitive to certain clues which may point toward creativity. The following techniques should be considered in assessing once the criteria are understood:

1. Casual, informal interviews with the child by parents, teachers, and counselors are desirable. Such interviews should occur on numerous occasions. Suggestions for interviewing appear on page 28.

2. Checklists should be filled out by parents, teachers, counselors, and administrators.

3. Interviews with parents, teachers, counselors, peers, and administrators are suggested in order to pinpoint observations concerning the child. Interview questions may include those appearing on the checklists. Interviewing simply expands checklist responses.

4. Analysis of the Cumulative Record Folder is sometimes desirable. Certain behaviors and interests may be revealed by a standardized individual intelligence test, achievement tests, aptitude test, and health records.

Some suggestions regarding the use of the Cumulative Record Folder need to be made. Some research has indicated that intelligence as measured by an intelligence test and creativity may be related (6). Other research indicates a low correlation between IQ scores and creativity scores (6,7). The current emphasis on high IQ's in gifted programs is unjustified; the cut-off IQ required to enter many gifted programs with a creativity component is usually set too high (1a, 8). Most intelligence measures are constructed so that they actually measure what the child has already learned, not his/her capacity to learn. Intelligence tests generally measure convergent thinking by calling for single acceptable answers to precisely defined problems and situations. In many cases the answers are conventional ones requiring lower thought processes. A student scoring well is often the one who can remember, recognize, and apply rules to solve problems but these processes give little indication whether the child can invent, explore, or infer. Information provided by parents, teachers, counselors, peers, and administrators is more valuable in determining such characteristics as interests, leadership ability, motivation, and ability to think divergently. This is particularly important when dealing with preschool children who might be scientifically creative.

CHARACTERISTICS OF SCIENTIFICALLY CREATIVE ELEMENTARY STUDENTS

The following are selected characteristics which may point toward creativity in science among elementary students. These characteristics were selected from studies and opinions of psy-

chologists and educators and frequently appear on various checklists. It should be remembered that a creative child may not exhibit all the following. Rather they should be viewed as "clues." Among the most cited characteristics of creative children are:

1. A prolonged and highly motivated interest in science as evidenced by avid reading, projects, collections, intense questioning, and curiosity.
2. Adept at divergent thinking; suggests alternative methods for performing tasks and solving problems.
3. Wide range of interests.
4. Inquisitive; asks "why?"
5. Very observant; looks at things closely.
6. Ability to hypothesize and infer.
7. Tells imaginative stories; thinks of other ways to end stories.
8. Self-confident.
9. Self-disciplined.
10. Tends to dominate; rather assertive.
11. Impatient.
12. Uses advanced verbal expressions.
13. Able to show relationships between apparently unrelated ideas; doesn't see what most people "take for granted."
14. Tends to work individually rather than in groups.
15. Rather blunt in appraisals; doesn't "beat around the bush."
16. Eager to take a chance; does new things; risk oriented.
17. Maturity in his/her sense of humor.

18. Sometimes interrupts other people; eager to contribute and criticize.

19. Is reading books above his/her grade level.

20. Mathematically oriented.

It is important to remember that "science" is a broad discipline. Specific characteristics and interests of an experimental physicist, for example, might be quite different than those for a biologist. The same is true for the interests and talents of children in the elementary grades.

SUGGESTIONS FOR ADMINISTRATORS

Administrators are responsible for educational development and programming. Therefore persons in administrative positions should be aware of creative science objectives. Administrators may contribute to these objectives by:

1. Attempting to assign creative teachers to guide creative children in science.

2. Constantly evaluating curricular successes and failures as clues for improvement.

3. Brainstorming with teachers, parents, and persons in the community.

4. Developing good positive communications between administration and faculty.

5. Becoming actively involved in the creative science experience (construct or improvise some apparatus, participate directly on occasion).

6. Assigning recognized creative teachers to work with other teachers in developing creative activities and attitudes.

7. Recognizing students' creative work in science. Activities, projects, and achievements should be publicized.

8. Complimenting teachers, students, and parents and by so doing provide needed positive reinforcement.

9. Stressing the need of developing a creative environment where there is freedom of expression and inquiry in all classrooms.

10. Avoiding overloading teachers with excessive duties and committee work. Creative teaching requires time.

11. Arranging for in-service training; bringing in guest teachers from other schools to explain what they are doing.

12. Experimenting with team teaching; also using persons in the community who are recognized as scientifically creative.

SUGGESTIONS FOR CREATIVE DIRECTION BY TEACHERS

1. Respect and reinforce creative scientific efforts of your students. Give positive recognition.

2. Don't promote conformity and convergency. Allow for considerable flexibility and freedom when children experiment and investigate.

3. Recognize and nurture a child's abiiity to solve problems, suggest hypotheses, design investigations, collect and analyze data, generalize, infer, and draw conclusions.

4. Stress divergency. Provide children with opportunities to learn that there are a number of ways they can look at a problem. Set a stage so that the possibility of several methods of finding an answer becomes the "rule" rather than the exception to the rule.

5. Children who are several grade levels ahead should be provided with activities that will keep them moving onward. Provide an opportunity for them to interact with other talented children.

6. Keep the child's curiosity alive. As a teacher (and consequently a model), you need to exhibit curiosity.

7. Encourage and reinforce free inquiry. When questions arise, let the children think of possible answers.

8. Scientifically creative persons require a high degree of independence. Do not overstress team work.

9. The creative child needs an unhurried, low anxiety-stress type environment.

10. Provide a wide range of opportunities and activities for the children to participate in.

11. Allow the children to make choices. Don't restrict them.

12. It is not necessary that all children perform the same activity at the same time.

13. Reinforce positive attitude.

14. Be a model---be creative yourself.

15. Show your children examples of creative work/expression.

16. Allow scientifically creative high school students and adults to interact with members of the class.

17. Encourage the children to make suggestions for creative work.

18. Stimulate the child's imagination; stress "why," "what if," and "how."

19. Brainstorm as a group activity. Brainstorming sets a mood for creativity.

CREATIVE QUESTIONING IN SCIENCE

Questions may be preplanned or spontaneously occur in class. Manipulate your students to a lesser degree by avoiding an excessive number of "yes" or "no" type questions. These require little thinking. The essence of science is student self-direction and discovery. One way you can help your students obtain a sense of direction is by telling them less, but asking appropriate questions. A properly worded question can be a hint or clue rather than a dead end.

1. General Questions (for use when students are experimenting and/or investigating).
    a. What do you notice about...this plant, animal...?
    b. What will happen if...?
    c. If so then...e.g., if these colors are mixed, then...?
    d. This is so, if what? e.g., this reaction takes place if...?
    e. Which is... e.g., which is heavier, lighter, smaller...?
    f. If a...were a ...then what would...?
2. Questions To Stimulate Creative Responses
    a. What would you do in order to design this experiment better?
    b. How would you organize this better?
    c. What hypotheses can you make concerning...?
    d. How could we improve...?
    e. How would you design an experiment to find out...?
    f. What if this were changed?
    g. What other uses can you think of for...?
    h. What other materials could we use?

3. Questions For Problem Solving

a. What was the nature of the problem?

b. What did you know about the problem to start with?

c. What designs/procedures did you use in solving the problem?

d. Do you see any particular strengths and/or weaknesses in your procedures?

e. What hypotheses did you reach?

f. What factors and/or variables were involved in the problem you were investigating?

g. What assumptions were you going on?

h. If you used terms, how did you define them?

i. What data did you collect?

j. What did you use as a control? Why?

k. What does your data suggest to you?

l. If you were investigating this problem again, what changes would you make? Why?

m. Can you think of any possibilities for further investigation around this problem?

It should be remembered that the above questions represent general types of questions. Depending on the students involved they will need to be phrased in the appropriate language level.

CONTRASTING A CONVERGENT AND DIVERGENT SCIENCE ACTIVITY

Change cookbook type experiments and investigations to make them more creative and open-ended. The following activity will initially be outlined as a traditionally convergent experiment. Then the same activity will be presented as an open-ended investigation.

Purpose: To investigate the effect of a material on the sprouting rate of seeds.

Materials: Seeds (radish, corn), water, trays, paper towels, hydrogen peroxide, H_2O_2.

Procedures:
1. Divide the seeds of one type into two equal les.
2. Place these seeds on two trays containing paper towels.
3. Add x ml. water to one tray and x ml. hydrogen peroxide to the other tray.
4. On the following day count and remove the seeds that have sprouted from each tray. Keep a record of results.

Open-ended Approach:

Purpose: What things help seeds sprout faster?

Materials: Let students suggest.

Opening Questions:
1. What happens when you help your parents plant seeds in the garden?
   note: Immediately the child is involved; we begin by presenting the problem in a familiar situation.
2. Can you think of things that help seeds sprout and grow faster?
3. How would you use radish and/or corn seeds in an experiment to show what happens?
4. What experiment would you set up to show whether vitamins help seeds sprout?
   note: When we ask what things may help seeds sprout faster we are likely to get an array of possibilities. Many students will respond with water or darkness but what would be wrong with minerals, vitamins, fertilizers, or combinations of such things?

The teacher then allows the student(s) to set up their own experiments by responding to requests for equipment, materials, and assistance. The students make their own observations, collect their own data and reach a conclusion(s).

Post-Discussion

1. What did you conclude from your experiment?

2. How would you improve your experiment if you were going to do it over?

3. Do you see any other experiments we could do as a result of the experiment you just did?

note: The importance of this comparison of two lab activities is to point out how not to shut the door of inquiry. In the latter approach we have left an open door for further inquiry if the interest is there. The child was asked what he/she concluded but in no sense was the conclusion meant to be something absolute and final.

SELF-IMPROVEMENT ACTIVITIES FOR THE ELEMENTARY TEACHER

Activities for self-improvement for the teaching of science in a creative manner could include:

1. Continued training through science institutes, workshops, special courses, methodology courses, and education of the gifted courses. There is no substitute for a good background in basic science concepts.

2. Reading up-to-date journals for improvement of background. Such journals might include Science and Children, Science World, Nature and Science, Science Newsletter, Gifted Child Quarterly, Journal of Creative Behavior, and Learning.

3. Active participation in revising and developing science curriculum and teaching strategies.

4. Experimenting with team teaching and subsequent self-evaluation and evaluation of fellow participants.

5. Video-taping for self-evaluation.

6. Utilizing expertise of personnel at the Indiana Department of Public Instruction as well as state colleges and universities.

7. Joining and becoming active participants in state science/education organizations, especially the Hoosier Association of Science Teachers, Inc.

SUGGESTIONS FOR PARENTS

To encourage science interests in elementary children, parents should know the child, be aware of his/her school activities, and plan a wide breadth of family activities. Supporting parents play key roles in molding positive attitudes toward learning. Parents can devise ways of encouraging the child's interests in science.

1. Parents should create an atmosphere which encourages reading.
   a. Parents who read and place an emphasis on reading skills tend to have children who can read and want to read.
   b. Parents can give appropriate books to the child as gifts.
   c. Parents should provide the child with his/her own bookshelves and books.
   d. Parents should take their children to libraries and bookstores.
   e. Parents can seek advice on science book selection from librarians, science teachers, State Department of Public Instruction, and university resource personnel.
2. Parents should plan a wide range of activities and encounters for the child.
   a. Plan vacations and weekend trips to include a diversity of geographic areas.
   b. Parents should be supportive of hobbies which involve science and scientific materials. Durable microscopes, science kits and such are available.

c. Parents should encourage a child by allowing a space for experimenting and investigating, a plot of ground and/or a corner in the basement or bedroom.

d. Parents should consider the value of their child belonging to organizations which could foster an interest in science (4-H, scouting, nature clubs, etc.).

e. Parents should become familiar with local and regional resources that foster scientific interests. Parents should take their child to museums, zoos, parks, wildlife sanctuaries, planetariums, universities, and other such places.

f. Parents should emphasize family discussions or "table talk" around science topics.

g. Parents should welcome the questioning of the child. Avoid "don't do," "don't bother me," and other negative responses to questions. Children receiving too much negative reinforcement tend to become less inquisitive and creative.

CHECKLIST FOR TEACHERS AND ADMINISTRATORS

The following list of characteristics represent traits known to occur in gifted children. The list is by no means inclusive. If a child is described or checked by at least 12 of the following items, you might want to observe him/her more carefully. Those items which strongly pertain to the child should be double checked.

___ 1. Has strong interest in science.

___ 2. Has a reading interest in science related topics.

___ 3. Strong in math.

___ 4. Has a wide range of interests.

___ 5. Eager to try new things and new ways.

___ 6. Aggressive, dominates, assertive.

___ 7. Prefers to work individually.

___ 8. Self-confident.

___ 9. Self-disciplined.

___ 10. Approaches and solves science problems in ingenious ways.

___ 11. Alert and responds rapidly; answers questions rapidly.

___ 12. Proposes imaginative stories or endings to stories.

___ 13. Impatient.

___ 14. Verbally advanced.

___ 15. Inquisitive in respect to scientific things.

___ 16. Very observant in analyzing things.

___ 17. Can show relationships among apparently unrelated ideas.

___ 18. Has a positive attitude; not negative or cynical.

___ 19. Quite frank; blunt; does not beat around the bush in appraisals.

___ 20. Expresses an understanding of abstract ideas; asks about abstractions.

___ 21. Demonstrates ability to assemble new or difficult puzzles.

___ 22. Uses a reasoning process to explain why something is occuring or how it could be used.

___ 23. Builds intricate structures or designs.

___ 24. Has a mature sense of humor.

___ 25. Exhibits the ability to propose hypotheses.

___ 26. Adept at collecting and analyzing data.

___ 27. Exhibits intense concentration.

___ 28. Persistent even in the face of failure.

___ 29. Nonconforming.

___ 30. Exhibits divergency in thinking (comes up with alternative methods, answers, etc.).

___ 31. Is a collector (shells, plants, fossils, puzzles, riddles).

ADDITIONAL COMMENTS:

How would you describe the way this child's peers view him/her?

CHECKLIST FOR PARENTS

Family Activities

Yes No

___ ___ 1. Do you actively participate in activities of scientific discovery with your child?

___ ___ 2. Do you take your child to places which are science resource areas (planetariums, zoos, parks, labs, etc.)?

___ ___ 3. Do you encourage your child to make collections and investigate in scientific topics?

___ ___ 4. Do you aid your child in working on simple science experiments?

___ ___ 5. Have you made an effort to take the child to see something he/she has been studying about in science?

___ ___ 6. Do you acquire science oriented books for the child?

___ ___ 7. Do you encourage selection of good science oriented programs on TV for your child?

Home Environment

___ ___ 8. Does your child have his/her own science books and bookshelf space?

___ ___ 9. Does your child enjoy fixing, building, and trying new things?

___ ___ 10. Have you made an effort to instill a positive appreciation of living plants and animals in your child?

___ ___ 11. Have you made simple and durable science equipment available to your child?

___ ___ 12. Does your child enjoy puzzles, riddles, and other "brain testing" type exercises and games?

___ ___ 13. Do you allow your child to have pets; have you instructed the child on the proper care and handling of pets?

___ ___ 14. Does your child ask a lot of "why" and "how" type questions?

___ ___ 15. Have you provided your child with space where investigations and experiments can be performed?

Home-School Relations

___ ___ 16. Are you familiar enough with your child's school programs and activities to discuss their strengths and weaknesses?

___ ___ 17. Do you know what your child is studying in science now?

___ ___ 18. Have you visisted with your child's teacher about your child's interests, motivations, aptitudes, and general progress?

___ ___ 19. Does your child talk to you about science books he gets at school?

___ ___ 20. Does your child talk about "projects" which may be science-oriented?

___ ___ 21. Do you maintain a positive attitude at home toward school and your child's teacher?

Attitudes and Interest

___ ___ 22. Can you describe an area in science that is particularly interesting to your child?

___ ___ 23. Do you take the time to help your child arrive at understandings rather than simply giving them the answer?

___ ___ 24. While encouraging your child to discover have you de-emphasized the notion of "absolute truth?"

___ ___ 25. Do you guide your child in making careful observations before making statements and drawing conclusions?

___ ___ 26. Do you encourage perseverance rather than allowing the child to jump non-stop from one thing to another?

___ ___ 27. Are you familiar with the way scientists work?

Additional Comments:

CHECKLIST FOR PARENTS (PRESCHOOL, AGES 2-3)

Your comments on the following questions will be very helpful. Whenever possible we would like examples and additional comments by you.

1. How old (in months) was your child when he/she said their first words? ___ Before 8 months ___ Between 8-10 months ___ Between 11-13 months ___ After 13 months

2. At what age did your child put two words together in making a simple sentence (such as "more milk," "daddy go.")?
___ Before 12 months ___ Between 12-14 months
___ Between 15-17 months ___ After 18 months.

3. When was your child able to point to at least three body parts when asked to do so?
___ Before 12 months ___ Between 12-14 months
___ Between 15-17 months ___ After 18 months

4. At about what age did your child have a vocabulary of around 50 words?
___ Before 18 months ___ Between 19-21 months
___ Between 22-24 months ___ After 25 months

5. Does your child recognize and name two-digit numbers?
___ Yes ___ I think so ___ No

The following are "yes" and "no" responses to questions.

Yes	No	
___	___	6. Is your child able to print over 13 letters of the alphabet with copying?
___	___	7. Does your child build elaborate and detailed structures with blocks, Tinker Toys, or other materials?

___ ___ 8. Can your child draw a human form with some degree of realism in the body parts?

___ ___ 9. Can your child draw or copy a diamond shape?

___ ___10. Has your child asked the meaning of abstract terms such as space and time?

___ ___11. Does your child read stories that contain many words and few pictures?

___ ___12. Does your child tell time by the hands on a clock?

___ ___13. Does your child use and understand the days of the week? For example, if today is Monday does your child realize that the day after tomorrow will be Wednesday?

___ ___14. Is your child reading books generally for kindergarten or first grade students and <u>understanding</u> the words?

___ ___15. Is there any tendency for your child to prefer the reading of science-oriented books?

___ ___16. Has your child exhibited the ability to solve problems involving simple subtraction?

___ ___17. Does your child recite from memory the alphabet or the numbers 1 through 30, for example?

___ ___18. Does your child understand which sex he/she is when asked?

___ ___19. Does your child ever make up new parts to songs, stories, or poems?

___ ___20. Does your child "sound out" new words that are not familiar?

___ ___21. Does your child ever use conjunctions such a "however," or "although" in sentences?

___ ___ 22. If given a list of numbers 1-10, does your child recognize one of the numbers if pointed out?

___ ___ 23. Has your child exhibited the ability to use or draw maps?

___ ___ 24. Is your child able to put puzzles of over 25 pieces together?

___ ___ 25. Does your child ever write notes or short letters?

___ ___ 26. Does your child know his/her address and telephone number?

___ ___ 27. If given a list of the letters of the alphabet would your child be able to recognize at least half of them?

___ ___ 28. Can your child identify at least 6 colors?

___ ___ 29. Has your child exhibited the ability to deal with multiplication and/or division?

___ ___ 30. Does your child know his/her left hand or foot from the right hand or foot?

___ ___ 31. Does your child have a sense of order in the home; does he/she know where things are kept or should be kept?

___ ___ 32. Is your child able to take a collection of things and categorize them into sub-groups?

___ ___ 33. Has your child associated certain objects because they have similar shapes (such as the new moon and a banana, or a globe and a basketball)?

INTERVIEWING

The following are suggested techniques which may be useful for teachers, counselors, administrators, or parents when visiting with a child.

1. Interviewing a child should be done in a relaxed, informal manner. The best interview might well occur when the person doing the interviewing is actively engaged in whatever the child is doing (playing, investigating, building something, etc.).

2. Ask the child "leading" questions that emphasize "how," "why," and "what if."

3. Do not base solid opinions on only one interview. Numerous visits and observations are much preferred.

When interviewing parents, administrators, teachers, and counselors:

1. Interview questions may represent expansions of those questions appearing on the checklists.

2. Interviews should occur on a regular basis. A minimum of one interview per year is recommended.

3. Interviewing is best accomplished in a casual and informal setting.

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